

REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

Initially, the Examiner indicated that claims 14, 20, 25 and 27 contain allowable subject matter, and would be allowed if rewritten in independent form. Applicant submits that the allowable status of these claims is unchanged by the present amendment and, therefore, claims 14, 20, 25, and 27 will not be discussed further herein.

Claims 22, 24 and 27 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims have been amended as suggested by the Examiner. Accordingly, the rejection of claims 22, 24 and 27 under 35 U.S.C. 112, second paragraph, should be withdrawn.

Claims 11, 13 and 17-19 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-197,815 (JP '815) and in view of JP 04-124,233 (JP '233). The rejection is traversed for the following reasons.

The invention of claim 11 is directed to a metal molded product production line including a stirring means and a stirring means restoring apparatus. The stirring means includes a cooling metal and a viscosity measuring probe. The stirring means is immersed in the melt and moves horizontally through the semi-solid metal to affect stirring of the semi-solid metal. A horizontal force exerted on the viscosity measuring probe as the stirring means is moved through the semi-solid metal is

used to measure the viscosity of the semi-solid metal.

JP '815 teaches an apparatus for producing semi-solidified metal having a cooling and stirring means. The molten metal (12) is received in a crucible (42a, 42b) and is stirred using the cooling members (56a-56d). Cooling members (56a-56d) are integrally attached to a driving mechanism (58). The abstract of JP '815 does not expressly discuss the method of stirring the molten metal, but it is apparent from the figures (specifically FIG. 1) that the only feasible method for stirring is for the driving mechanism (58) to rotate the cooling members (56a-56d) within the crucible (42a, 42b). Therefore, JP '815 does not teach a stirring means that moves horizontally within the melt. Further, JP '815 does not teach a viscosity measuring probe, or measuring viscosity of the melt with such a viscosity measuring probe as the stirring means is moved horizontally within the melt.

JP '233 teaches an apparatus for the manufacture of half-solidified metal. Specifically, JP '233 is cited by the Examiner for teaching a viscosity measuring means. The apparatus comprises a stirrer (5), a cooling means separate from the stirrer (10), a bath (2) for holding the molten metal, and a torque detector (8) at a rotating and driving system (7) of the stirrer (5). The molten metal is stirred by rotation of a stirrer (5) via a driving system (7). It is apparent from the disclosure that the only feasible manner in which viscosity can be measured is through the torque detector (8) monitoring the output of driving system (7) on the stirrer (5). JP '233 fails to teach an apparatus for measuring viscosity based on the horizontal force exerted on a viscosity measuring probe as the stirring means are moved horizontally through the melt.

Accordingly, the prior art cited by the Examiner fails to teach a stirring means

moved horizontally within a melt and a viscosity measuring probe that detects viscosity based on the force experienced as the stirring means is moved within the melt, as required by claim 11. Keeping in mind that the references fail to teach the structural and functional features of the present invention, even if the references were combined the present invention would not result.

Accordingly, it is submitted that the combined teachings of JP '815 in view of JP '233 do not render obvious the invention defined in claim 11, and reconsideration and withdrawal of the rejection of claim 11 based upon these references is requested. As claim 13 depends from claim 11, reconsideration and withdrawal of the rejection to claim 13 is also requested.

With further reference to claim 13, the defined invention includes a viscosity measuring apparatus including the probe in the form of a cantilever beam having a lower portion immersed in the melt. The viscosity measuring apparatus also includes a probe moving means, a load cell for measuring a horizontal force received by the probe, and a converting means for converting the force detected by the load cell into a viscosity of the semi-solid metal. As the combined references teach neither a horizontal movement through the melt nor a viscosity measurement based on a resultant horizontal force experienced, the references fail to teach the features of claim 13 and, therefore, the rejection to claim 13 should be withdrawn.

The invention of claim 17 is directed to a metal molded product production method, and includes the steps of: producing a slurry-form semi-solid metal by stirring and cooling a melt contained in a vessel with stirring means having a cooling metal immersed in the melt and measuring the viscosity of the melt using a viscosity measuring means, whereby stirring comprises moving the stirring means horizontally

through the melt and viscosity measuring comprises detecting a force exerted on an immersed portion of the viscosity measuring probe as the stirring means is moved horizontally through the melt. After production of the semi-solid metal, a predetermined restoring treatment is carried out on the stirring means.

JP '815 and JP '233 do not teach stirring by moving a stirring means horizontally within the melt. Further, JP '815 and JP '233 do not teach viscosity measurement by detecting a force exerted on an immersed portion of the viscosity measuring probe as the stirring means is moved horizontally through the melt. Rather, each of JP '815 and JP '233 perform stirring by rotating a stirring or cooling member. Further, the only reference that teaches measuring viscosity (JP '233), teaches measuring viscosity based upon torque (resistance to rotation) of the stirring implement. Accordingly, it is respectfully submitted that the cited references do not teach the inventive method defined in claim 17. Therefore, reconsideration and withdrawal of the rejection of claim 17 is hereby requested. Claims 18 and 19 depend from claim 17, and are likewise allowable over the art of record.

Claims 12, 15, 16, 21 and 26 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '815 in view of JP '233 as applied to claim 11 and further in view of JP 10-211,565 (JP '565). The rejection is traversed for the following reasons.

Initially, it is noted that the JP '565 reference does not remove or correct the deficiencies of the base references relative to claims 11 and 17, from which claims 12, 15, 16, 21, and 26 depend. Notably, the JP '565 patent is not believed to teach stirring and viscosity measuring, as is required by the presently claimed invention. Accordingly, for this reason alone, claims 12, 15, 16, 21, and 26 are considered to

be allowable over the art of record.

The invention of claim 12 is directed to the production line of claim 11 wherein the vessel is adapted to receive a predetermined amount of the melt and the line further comprises a molding machine, a carrying apparatus for carrying the vessel from the production apparatus to the molding machine and feeding the semi-solid metal into the molding machine, and a vessel restoring apparatus.

JP '565 teaches a device for producing precasting metal. Specifically, JP '565 teaches a process for producing a molten alloy with a fine primary crystal crystallized therein by injecting air at the outside of a holding container (1) filled with molten metal. The injected air results in a cooling of the holding container (1) and the molten metal within it. Thus, the JP '565 reference teaches a molten alloy/crystal forming process, and does not teach a vessel restoring process.

Therefore, the features of claim 12 are not taught or suggested by the references, either alone or in combination. Reconsideration and withdrawal of the rejection of claim 12 is requested. Claims 15, 16, and 26 depend from claim 12, and are likewise considered to be allowable over the art of record.

The invention of claim 21 is directed to cooling the vessel for preparation for the next cycle following the emptying of the vessel. JP '565 is directed to cooling the vessel during the operation, not following the operation. Thus, JP '565 fails to teach cooling the vessel between cycles. Accordingly, the invention defined in claim 21 is not rendered obvious by the proposed combination of references, and reconsideration and withdrawal of the rejection of claim 21 is requested.

Claims 22-24 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '815 in view of JP '233 and JP '565 as applied to claim 12 and further in view

of applicant's admitted prior art as set forth in pages 10-11 of the specification or JP 63-256,257 (JP '257).

It is respectfully noted that neither the admitted prior art nor JP '257 remove or eliminate the shortcomings of JP '815 and JP '233 as they relate to claim 17. Notably, neither JP'257 nor the admitted prior art teach or suggest stirring and viscosity measuring as set forth in claim 17, from which claims 22-24 depend. Accordingly, for this reason alone, claims 22-24 are considered to be allowable over the art of record, and the Examiner is asked to reconsider and withdraw the rejection thereof.

Claims 28-33 have been added to the application. Support for the claims can be found on page 26, lines 17-22, page 28, lines 8-15, page 44, lines 5-18, and in Figures 2, 3, 16 and 17.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SHM-16408.

Respectfully submitted,

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